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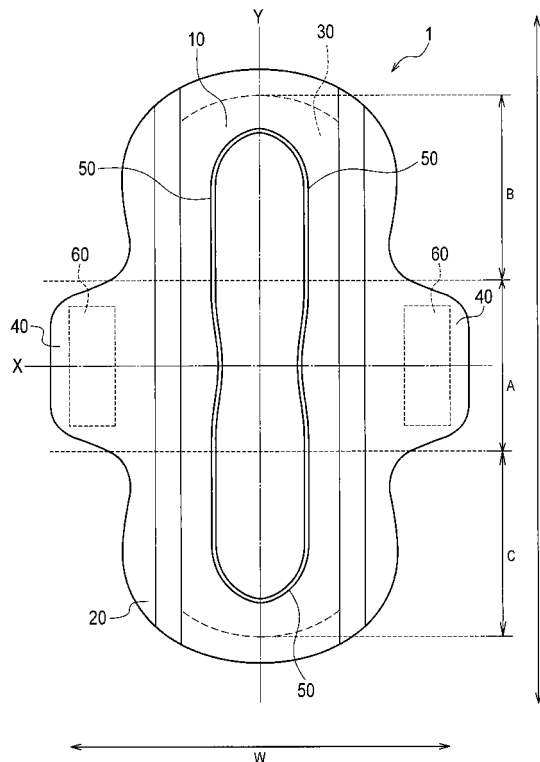
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(54) **ABSORPTIVE ARTICLE**

(57) A compression region 50 includes a low compression region 53, in a plan view from a side of a skin contact portion. A density of the low compression region 53 is higher than that of a non-compression region 30a of absorbent article 1. The low compression region 53 is provided with a high compression region 54. The high compression region 54 has a further increased density of the absorber 30. A contact portion 54a of the high compression region 54 contacts with a contact portion 53a of the low compression region 53.

FIG. 1



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Description

[Technical Field]

[0001] The present invention relates to an absorbent article including a compression region in which a density of an absorber is increased by a compression process.

[Background Art]

[0002] In order to prevent leakage of fluid or improve a fit feeling of absorbent articles such as sanitary napkins, it has been proposed to provide the absorbent article with a channel in an absorbent surface by a compression process (see Patent Document 1).

[0003] Patent Document 1 discloses the channel formed so as to include a high compression region in which an absorber has an increased density and a low compression region in which a density is lower than that of the high compression region, by being compressed by a compression roller having a projected portion. The high compression region is formed within the low compression region.

[0004] Generally, it has been known that the absorber exhibits higher absorbability in a high-density portion compared with a low-density portion. Thus, in the absorbent article described in Patent Document 1, fluid is absorbed by the absorbent article from a non-compression portion through the low compression region to the high compression region.

[0005] Since the high compression region is surrounded by the low compression region in the absorbent article described in Patent Document 1, in a case where the low compression region comes in contact with fluid of an amount in excess of its absorbent capacity, the fluid may undesirably spread across the channel into the absorbent surface during the period from when the fluid is shifted from the low compression region to the high compression region to when the low compression region regains an absorbing ability. This delay in absorption results in leakage of the fluid to the exterior of the absorbent article.

[0006] In view of this, it is assumed that absorption of the fluid is accelerated by increasing an area of the high compression region. However, direct formation of the high compression region on the absorbent surface without the low compression region causes an increased stress exerted on a topsheet around the high compression region, thereby leading to a problem that the absorbent surface easily tears along a boundary between a non-compression region and the high-compression region.

[Prior Art Document]

[Patent Document]

[0007] Patent Document 1: Japanese Patent Application Publication No. 2000-14701 (Fig. 5 for example)

[Summary of Invention]

[0008] An absorbent article (absorbent article 1) of first aspect includes: a topsheet (topsheet 10) of liquid-permeable having a skin contact surface brought in contact with a skin of a wearer; a backsheet (backsheet 20) of liquid-impermeable; and an absorber (absorber 30) disposed between the topsheet and the backsheet. The absorbent article is provided with a compression region (low compression region 53) in a channel form at a side of the skin contact portion, the compression region having an increased density with respect to at least the topsheet and the absorber by a compression process. The compression region is provided with a high compression region (high compression regions 54A, 54B) having a further increased density. The high compression region has a contact portion (contact portions 54a, 54b) in point-contact with a non-compression region not subject to compression, in a plan view of the absorbent article.

[Brief Description of Drawings]

[0009]

Fig. 1 is a plan view showing an absorbent article according to an embodiment of the present invention as seen from a skin contact surface side of a user.

Fig. 2 is a perspective view including a cross section taken along the line X-X of the absorbent article in Fig. 1.

Fig. 3(a) is an expanded view of a compression region of the absorbent article at the skin contact surface side and Fig. 3(b) is an expanded view of a cross section of the compression region.

Fig. 4(a) is an expanded view illustrating another pattern of the compression region of the absorbent article at the skin contact surface side and Fig. 4(b) is an expanded view of a cross section of the compression region.

Figs. 5(a) and 5(b) are expanded views each illustrating yet another pattern of the compression region of the absorbent article at the skin contact surface side.

Fig. 6 is an expanded view illustrating still another pattern of the compression region of the absorbent article at the skin contact surface side.

Fig. 7 is a schematic view illustrating an outline of a device for forming the compression region.

Fig. 8 is an expanded view showing region F7 of a roller included in the device for forming the compressing region.

[Description of Embodiments]

[0010] An embodiment of an absorbent article according to the present invention will be described with reference to the drawings. Note that, in the following description of the drawings, the same or similar numerals denote the same or similar portions. In addition, it should be noted that the drawings are schematic and ratios of dimensions and the like are different from actual ones. Therefore, specific dimensions and the like should be determined in consideration of the following description. Moreover, as a matter of course, the drawings also include portions having different dimensional relationships and ratios from each other.

[0011] Fig. 1 is a plan view showing an absorbent article 1 according to this embodiment as seen from a top-sheet side (a skin contact surface side of a user). Fig. 2 is a perspective view including a cross section taken along the line X-X of the absorbent article 1 in Fig. 1.

[0012] The absorbent article 1 is made up of a liquid-permeable topsheet 10, a liquid-impermeable backsheet 20, an absorber 30 disposed between the topsheet 10 and the backsheet 20, and wing portions 40 made from nonwoven fabric, projected laterally from both end sides of the absorbent article 1. The absorbent article 1 has a central region A in a longitudinal direction L, as well as an anterior region B and a posterior region C positioned outside the central region A in the longitudinal direction L.

[0013] The topsheet 10 is nonwoven fabric in this embodiment. The topsheet 10 is not particularly limited in raw material as long it is made from sheet-shaped material with a liquid-permeable structure, such as woven fabric or a perforated plastic sheet. Both natural fiber and chemical fiber may be used as material of woven fabric or nonwoven fabric. In this embodiment, only the topsheet 10 is disposed at the skin contact surface side of the absorber 30.

[0014] Examples of natural fiber include cellulose such as ground pulp or cotton. Examples of chemical fiber include regenerated cellulose such as rayon or fabric rayon, semi-synthetic cellulose such as acetate or triacetate, thermoplastic hydrophobic chemical fiber, or thermoplastic hydrophobic chemical fiber treated by a hydrophilic treatment. Examples of thermoplastic hydrophobic chemical fiber include a mono filament such as polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), fiber obtained by graft-polymerizing polyethylene and polypropylene, and composite fiber with, e.g., a core-clad structure.

[0015] As a web forming method of nonwoven fabric, either one of a dry type (such as a card method, a spun bond method, a melt blown method, or an air-laid method) or a wet type may be adopted. A combination of the plurality of methods from the dry type method and the wet type method may also be adopted. The web forming method further includes a thermal bonding method, a needle punch method, and a chemical bonding method. A method of forming nonwoven fabric is not limited to the

aforementioned methods.

[0016] Furthermore, as the topsheet 10, spunlace formed in a sheet shape by a hydroentangling method may be used. Yet further, nonwoven fabric may also be used as the topsheet 10, such as nonwoven fabric having a patterned indented face at a top layer side or a patterned indented nonwoven fabric which is obtained by forming unevenness on nonwoven fabric by applying air at time of web formation. Formation of unevenness on the surface achieves reduction in body fluid spreading along a surface of the topsheet 10 before permeation thereto.

[0017] In this embodiment, a core wrap 21 is disposed more closely to clothing than the absorber 30. The core wrap 21 is a sheet having absorbability such as tissue and absorbs the liquid. The backsheet 20 is disposed more closely to the clothing than the core wrap 21. As the backsheet 20, for example, a film mainly made from, e.g., polyethylene or polypropylene, a perforated resin film, or a sheet obtained by bonding the perforated resin film to nonwoven fabric such as spunbond or spunlace nonwoven fabric. It is preferable that the backsheet 20 be made from material having enough flexibility to prevent a wearer from having an uncomfortable feeling at time of wearing. For example, it is preferable to use a film mainly made from low-density polyethylene (LDPE), with a weight (weight (g) per unit area, referred to as a basis weight) within a range of 15 to 30g/m².

[0018] In this embodiment, it is preferable to make the absorber 30 from any one or a combination of, e.g., pulp, chemical pulp, rayon, acetate, natural cotton, a polymer absorber, a fibrous polymer absorber, synthetic fiber, and foam, so that the absorber 30 hardly loses shape while giving little chemical stimulation. Examples of hydrophilic fiber include any one or a combination of cellulose such as ground pulp or cotton, regenerated cellulose such as rayon or fabric rayon, semi-synthetic cellulose such as acetate or triacetate, a particulate polymer, a fibrous polymer, thermoplastic hydrophobic chemical fiber, or thermoplastic hydrophobic chemical fiber treated by a hydrophilic treatment.

[0019] Among these examples, it is preferable to use ground pulp in consideration of low cost and the formability of the absorber. The absorber 30 obtained by combining hydrophilic fiber with a polymeric absorber may also be used. In this embodiment, the polymeric absorber is an absorbent hygroscopic granular polymer such as sodium acrylate copolymer.

[0020] The absorber 30 may be an air-laid sheet obtained by shaping the hydrophobic fiber or powder in a sheet form by the air-laid method. In a case of using the air-laid sheet as the absorber 30, the air-laid sheet preferably has a thickness of 0.3 to 5.0mm. Examples of the air-laid sheet include a combination of fiber and a fibrous polymer shaped in a sheet form with the use of a binder or the like. The fibrous polymer may be dispersed in a layer form in the air-laid sheet or may be one-sided in a thickness direction.

[0021] The absorber 30 may be made up of a single layer or a plurality of layers. Further, a sheet such as tissue, a cushion sheet, or a diffusion sheet may be disposed between the topsheet 10 and the absorber 30.

[0022] A pair of wing portions 40 are formed in the central region A of the absorbent article 1. The wing portions 40 are projected outwardly in a width direction of the absorbent article 1. The absorbent article 1 has fixture portions 60 on a surface of the pair of wing portions 30, on the opposite of a wear's skin side. The fixture portions 60 are to be fixed to underwear of the wearer. The fixture portions 60 are indicated by a dashed line in Fig. 1. The fixture portions 60 are provided with an adhesive member, adhesive tape, a hook-and-loop fastener, and the like. Further, adhesive members 70 in a form of a plurality of lines are applied in the longitudinal direction L onto a surface of the backsheet 20 which is brought in contact with the underwear of the wearer (not shown in Fig. 1, see Fig. 2). The pair of wing portions 40 are folded back on a crotch portion of the wear and fastened to the underwear by the adhesive members disposed on the fixture region 60.

[0023] As an adhesive member, a hot-melt adhesive member is used, which can be easily applied in a predetermined pattern. The hot-melt adhesive member is made from styrene polymer, tackifier, and plasticizer. As the styrene polymer, styrene-ethylene-butadiene-styrene block copolymer, styrene-butadiene-styrene block copolymer, styrene-isobutylene-styrene block copolymer, or the like may be used. In this embodiment, styrene-ethylene-butadiene-styrene block copolymer was used. While the adhesive member is not limited to the above examples, soft hot-melt adhesive having pressure sensitivity at room temperature may be used, which can be penetrated and adhered at room temperature into a gap between fiber and fiber of an adherend.

[0024] As shown in Figs. 1 and 2, the absorbent article 1 is provided with a compression region 50 in which the absorber 30 is compressed by a compression process. The compression region 50 has a thickness thinner than that of a region other than the compression region 50, of the absorber 30. Herein, the region other than the compression region 50 is referred to as a non-compression region 30a.

[0025] Next, the compression region 50 will be explained. Fig. 3(a) is a plan view of the compression region 50 as seen from the skin contact surface side. Fig. 3(b) is a cross section view showing a cross section of the compression region 50 taken along the line F3-F3 in Fig. 3(a).

[0026] The compression region 50 is formed in a channel shape, in which a density of at least the topsheet 10 and the absorber 30 is increased by the compression process in a plan view from the skin contact surface side. The compression region 50 is provided with high compression regions 54A, 54B in which a density is further increased. The compression region 50 is also referred to as a low compression region 53 since a density of the

compression region 50, which is increase by compression, is higher than that of a non-compression region 30a but is lower than that of the high compression regions 54A, 54B.

[0027] The low compression region 53 is formed in the longitudinal direction L of the absorbent article in a plan view of the absorbent article 1. A plurality of the high compression regions 54A, 54B are formed at predetermined intervals inside the channel (low compression region 53) of the absorbent article 1 in a manner to be placed therealong.

[0028] As shown in Fig. 3(a), the high compression region 54A has a contact region 54a in contact with the non-compression region 30a in a plan view of the absorbent article. The contact portion 54a has a length L2 in an extending direction of the channel (low compression region 53). The length L2 is smaller than a length L1 of each of the high compression regions 54 in the extending direction of the channel (low compression region 53). In this embodiment, the contact portion 54a of the high compression region 54 is in point-contact with the low compression region 30a.

[0029] The compression region 50 includes a first group G1 made up of the plurality of high compression regions 54A and a second group G2 made up of the plurality of high compression regions 54B. The high compression regions 54A making up the first group G1 have the contact portions 54a in contact with one end side 53a of the low compression region 53. That is, the first group G1 makes up the first group of high compression regions. The high compression regions 54B making up the second group G2 have contact portions 54b in contact with the other end side 53b of the low compression region 53. That is, the second group G2 makes up the second group of high compression regions.

[0030] In the example shown in Fig. 3, the first group of high compression regions 54A and the second group of high compression regions 54B are formed in a staggered configuration in the extending direction of the channel. Each of the high compression regions 54A is in a quadrilateral form in a plan view of the absorbent article 1. Each of the contact portions 54a is one vertex of the quadrilateral. Similarly, the high compression regions 54B are also quadrilateral and each of the contact portions 54b is one vertex of the quadrilateral.

[0031] Fig. 4(a) is a plan view from the skin contact surface side, for showing another pattern of the high compression regions formed in the low compression region 53. Fig. 4(b) is a cross section view showing a cross section taken along the line F4-F4 in Fig. 4(a). In the example shown in Fig. 4, the low compression region 53 is provided with high compression regions 55A, 55B, 55C. As shown in Fig. 4, the low compression region 53 includes the first group G1 made up of the plurality of high compression regions 55A, the second group G2 made up of the plurality of high compression regions 55B, and a third group G3 made up of the plurality of high compression regions 55C. The high compression regions

55A making up the first group G1 each have a contact portion 55a in contact with one end side 53a of the low compression region 53. The high compression region 55B making up the second group G2 each have a contact portion 55b in contact with the other end side 53b of the lower compression region 53. The high compression regions 55C making up the third group G3 are formed between the first group and the second group in a width direction of the channel (low compression region 53), so as to be parallel to the extending direction of the channel (low compression region 53).

[0032] The first group of high compression regions 55A and the third group of high compression regions 55C are formed in a staggered configuration. Further, the second group of high compression regions 55B and the third group of high compression regions 55C are formed in a staggered configuration.

[0033] It is generally known that in the absorber, a region having a higher density draws in fluid more easily. As described above, the absorbent article 1 includes the low compression region 53 a density of which is increased to be higher than that of the non-compression region, and the high compression regions 54A, 54B a density of which is further increased to be higher than that of the low compression region 53. Therefore, the fluid such as body fluid is easily drawn in from the low compression region 53 to the high compression regions 54A, 54B, thereby being easily drawn in the inside of the absorber 30. Thus, the absorbent rate of the fluid is improved, so that the fluid can be prevented from being leaked to the exterior of the absorbent article 1.

[0034] In the absorbent article 1, the contact portions 54a, 54b of the high compression regions 54A, 54B are in point-contact with the non-compression region 30a not subject to compression, that is, the end sides 53a, 53b of the low compression region 53, so that the stress exerted on the topsheet 10 is small in the contact portions 54a, 54b. This prevents damages such as breakage caused on the topsheet in manufacturing steps.

[0035] A large number of high compression regions which easily draw in the fluid can be disposed in a limited area (the low compression region 53) by arranging the low compression regions and the high compression regions formed in the compression region 50 in a staggered configuration as shown in Fig. 3. This increases the amount of fluid which can be absorbed at one time. Accordingly, the absorbability of the absorbent article 1 can be improved.

[0036] In this embodiment, only the topsheet 10 is disposed at the skin side with respect to the absorber 30. The fluid which has permeated the topsheet 10 comes in direct contact with composition elements of the absorber 30, such as pulp, hydrophilic fiber, a polymer absorber, or the like, so that the absorbent rate of the fluid is accelerated.

[0037] Therefore, the absorbability of the fluid can be further improved by forming the high compression regions 54A, 54B and the low compression region 53 in

the absorbent article in combination with a structure that no core wrap 21 is provided to the skin contact surface side. In this manner, leakage of the fluid can be certainly prevented.

[0038] In the above description, advantageous effects of the absorbent article provided with the high compression regions 54A, 54B shown in Fig. 3 were explained. However, even the absorbent article provided with the high compression regions 55A, 55B, 55C, shown in Fig. 4, produces similar advantageous effects. In a case of forming the compression region shown in Fig. 4 at the skin contact surface side, owing to existence of the third group G3, an area of the high compression regions is enlarged to thereby further accelerate the absorbent rate.

[0039] Next, another pattern of the high compression regions formed in the compression region 50 is explained. Figs. 5(a), 5(b) are plan views each illustrating another pattern of the high compression regions formed in the compression region 50 as seen from the skin contact surface side. Fig. 5(a) shows an example in which the low compression region 53 is provided with high compression regions 56A, 56B, in a substantially circular shape. Fig. 5(b) shows an example in which the low compression region 53 is provided with high compression regions 57A, 57B, 57C, in a substantially circular shape. Fig. 6 shows an example in which the low compression region 53 is provided with high compression regions 58A, 58B, in a heart shape.

[0040] In a case of the heart-shaped high compression regions 58A, 58B, it is preferable to form the compression regions 58A, 58B so that apexes 58a, 58b of the heart-shaped regions are in point-contact with the end sides 53a, 53b of the non-compression region 30a not subject to compression. In this manner, the stress exerted on the topsheet 10 can be decreased. This prevents damage to the absorbent surface.

[0041] As shown in Figs. 5 and 6, as long as the contact portion as a contact area between the high compression regions and the non-compression region has the length L2 in the extending direction of the channel (low compression region 53) smaller than the length L1 of each of the high compression regions in the extending direction of the channel, a shape of each of the high compression regions is not limited to a quadrilateral but may be shaped in a circular shape, a pattern such as a flower shape, a mark, or the like.

[0042] Next explained is a method of forming the low compression region and the high compression regions in the absorbent article 1 at the skin contact surface. Herein, a method of forming a pattern of the high compression regions 54A, 54B shown in Fig. 3 is explained as one example. Fig. 7 is a schematic view illustrating an outline of a device for forming the compression region 50. As shown in Fig. 7, a device 100 includes a first roller 110 and a second roller 120.

[0043] The first roller 110 is rotated in a machine direction MD along a flow direction through the manufacturing steps for the absorbent article 1 while coming in

contact with a continuous body 200 containing the absorber 30 between the topsheet and the backsheet. The first roller 110 has a surface provided with a compressing portion 111 for compressing the continuous body 200. The compressing portion 111 is projected in a direction of a normal of the first roller 110, in which a projected portion configured to form the high compression regions 54A, 54B is formed on a surface brought in contact with the continuous body 200. A surface of the second roller 120 is processed to be flat.

[0044] Fig. 8 is an expanded view of the compressing portion 111. The compression portion 111 has a surface in contact with the continuous body 200, the surface being provided with projected portions 112, 113. The projected portions 112 form the high compression regions 54A. The projected portions 113 form the high compression regions 54B. Each of the projected portions 112 has a corner portion 112a. The corner portions 112a are arranged in a row on an extended line at a side surface 111a in the direction of the normal of the first roller 110. More specifically, each of the corner portions 112a is formed so as to correspond to the side surface 111a of the compressing portion 111.

[0045] The continuous body 200 is conveyed in the machine direction MD while being sandwiched and pressed between the first roller 110 and the second roller 120. At this time, the continuous body 200 is pushed from one surface side, against the surface of the second roller 120 by the compressing portion 111 of the first roller 110. Accordingly, the continuous body 200 is provided with the compression region corresponding to a shape of the compressing portion 111.

[0046] As shown in Fig. 8, the side surface 111a of the compressing portion 111 formed on the surface of the first roller 110 corresponds to the corner portions 112a of the projected portions 112, so that the whole of respective projected portions 112 falls within a width of the compressing portion 111. This prevents a defect such as chipping of the corner portion 112a, thereby producing an effect that roller life is extended.

[0047] (Another embodiment) As described above, the details of the embodiment of the present invention has been exemplarily disclosed. However, it should not be understood that the description and drawings which constitute part of this disclosure limit the present invention. Based on this disclosure, various alternative embodiments, examples, and operation techniques are apparent to those skilled in the art.

[0048] For example, the foregoing embodiment of the present invention described a case in which the absorbent article is a sanitary napkin. However, the absorbent article is not limited to the sanitary napkin but may be a diaper, a pantiliner, a urine-receiving pad, and the like. Further, the foregoing embodiment described that the wing portions 40 are projected laterally from the both end sides of the absorbent article 1. However, the wing portions 40 may not be formed.

[0049] The high compression region formed in the

compression region 50 is not limited to shapes shown in Figs. 3 to 6. The end sides 53a, 53b, of the low compression region may not form a straight line but may form a waveform or the like.

[0050] The above embodiment described a case in which only the topsheet 10 is disposed at the skin side of the wearer. However, the core wrap 21 may be disposed between the topsheet 10 and the absorber 30.

[0051] Further, the recessed and projected portion (the high compression regions 54A, 54B and the low compression regions 53A, 53B, 53C) may be formed from a clothing contact surface side of the backsheet 20.

[0052] As described above, the present invention naturally includes various embodiments which are not described herein. Accordingly, the technical scope of the present invention should be only determined according to the subject matters recited in the scope of claims which is appropriate based on the foregoing description.

[0053] The entire content of Japanese Patent Application No. 2009-218184 (filed on September 18, 2009) is incorporated herein by reference.

[Industrial Applicability]

[0054] According to the present invention, provided is an absorbent article having a high compression region and a low compression region, which prevents damage to an absorbent surface in the manufacturing steps while exhibiting improved absorbability of fluid.

Claims

1. An absorbent article comprising:

a topsheet of liquid-permeable having a skin contact surface brought in contact with a skin of a wearer;
a backsheet of liquid-impermeable; and
an absorber disposed between the topsheet and the backsheet, wherein:
the absorbent article is provided with a compression region in a channel form at a side of the skin contact portion, the compression region having an increased density with respect to at least the topsheet and the absorber by a compression process;
the compression region is provided with a high compression region having a further increased density; and
the high compression region has a contact portion in point-contact with a non-compression region not subject to compression, in a plan view of the absorbent article.

2. The absorbent article according to claim 1, wherein:

the high compression region is shaped in a

quadrilateral in the plan view of the absorbent article; and the contact portion is one vertex of the quadrilateral.

3. The absorbent article according to claim 1, wherein: 5

in the plan view of the absorbent article, the compression region is formed in a longitudinal direction of the absorbent article; a plurality of high compression regions are formed at predetermined intervals in the longitudinal direction of the absorbent article; the absorbent article further includes: 10

a first group of the high compression regions having the contact portions in contact with one end side of the compression region in the channel form; and 15

a second group of the high compression regions having the contact portions in contact with the other end side of the compression region in the channel form; and 20

the first group of the high compression regions and the second group of the high compression regions are arranged in a staggered configuration. 25

4. The absorbent article according to claim 1, wherein: 30

in the plan view of the absorbent article, the compression region is formed in the longitudinal direction of the absorbent article; the plurality of high compression regions are formed at predetermined intervals in the longitudinal direction of the absorbent article; the absorbent article further includes: 35

a first group of the high compression regions having the contact portions in contact with one end side of the compression region in the channel form; 40

a second group of the high compression regions having the contact portions in contact with the other end side of the compression region in the channel form; and 45

a third group of the high compression regions formed between the first group of the high compression regions and the second group of the high compression regions; 50

the first group of the high compression regions and the third group of the high compression regions are arranged in a staggered configuration; and

the second group of the high compression regions and the third group of the high compression regions are arranged in a staggered configuration. 55

5. The absorbent article according to claim 1 further comprising:

an absorbent sheet for absorbing fluid, wherein:

the absorbent sheet is disposed between the absorber and the backsheet; and

only the topsheet is disposed at the side of the skin contact surface of the absorber.

FIG. 1

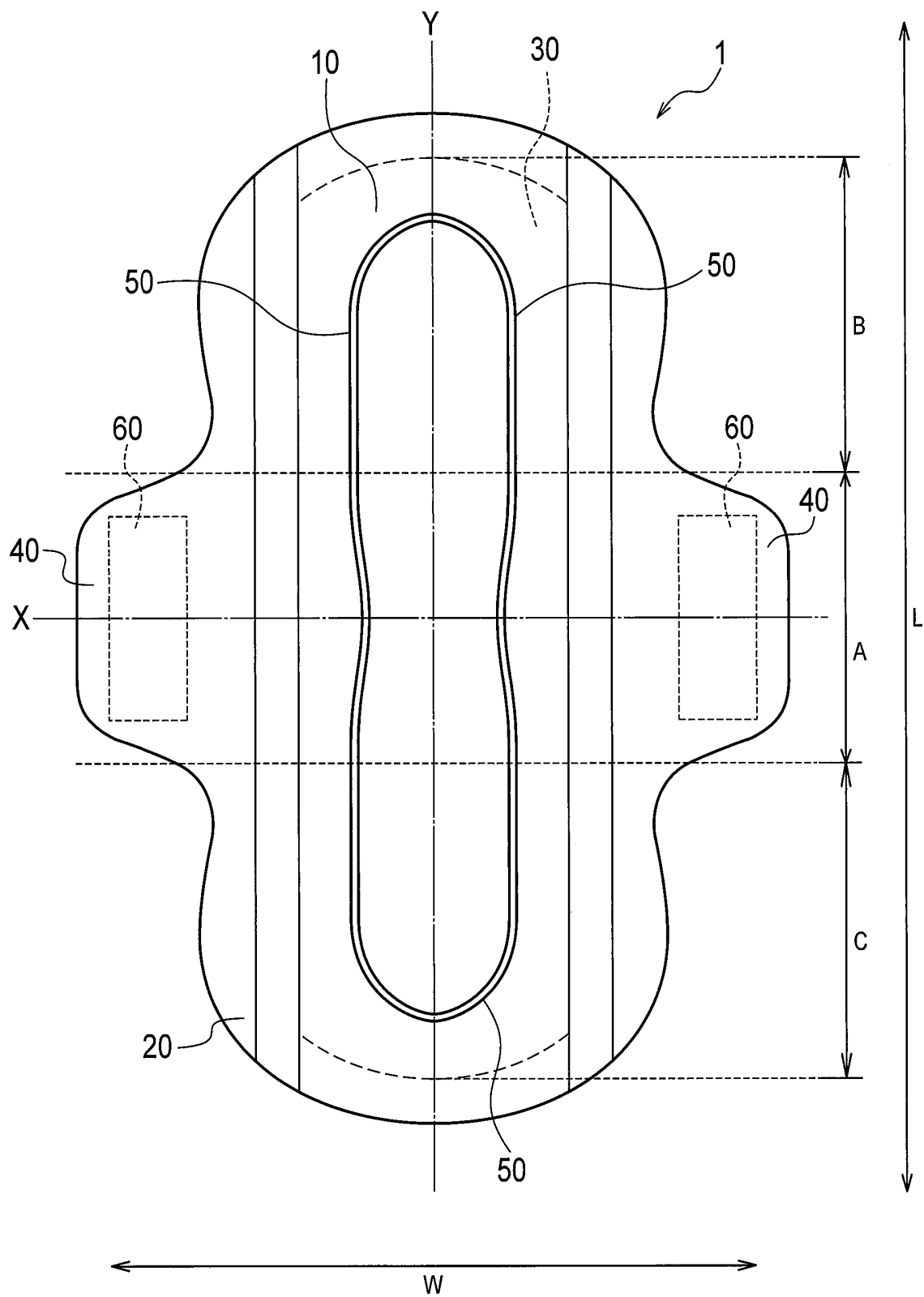


FIG. 2

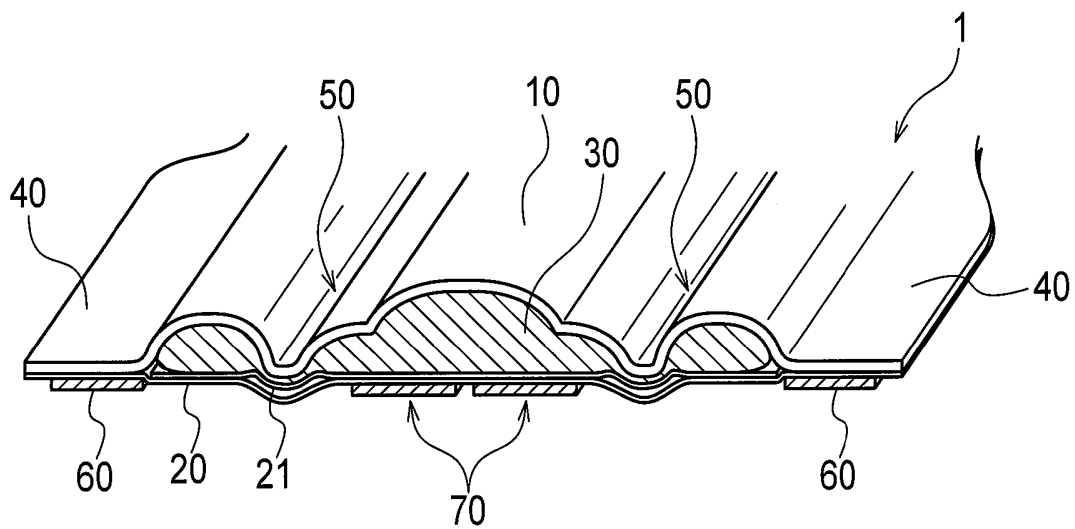
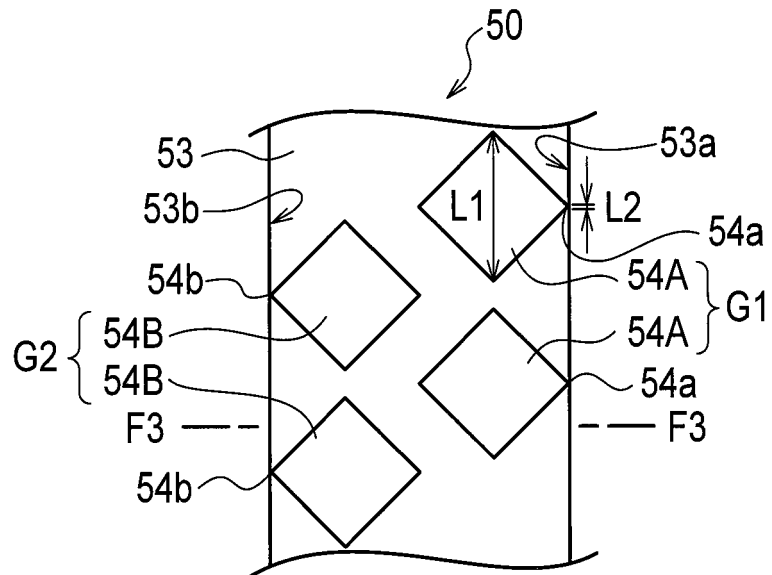


FIG. 3

(a)



(b)

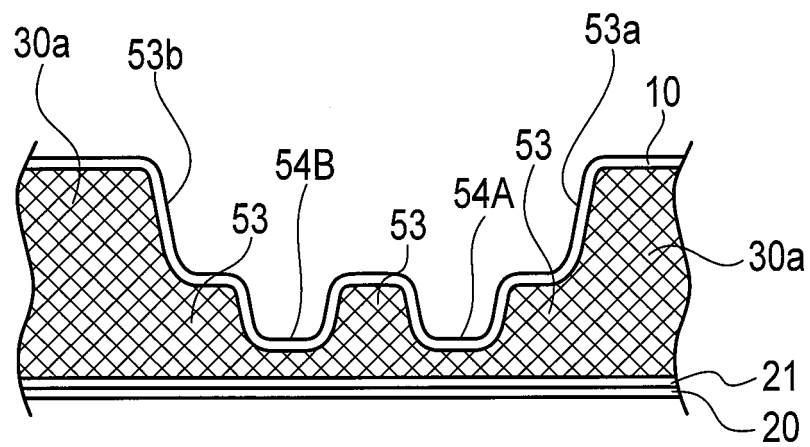
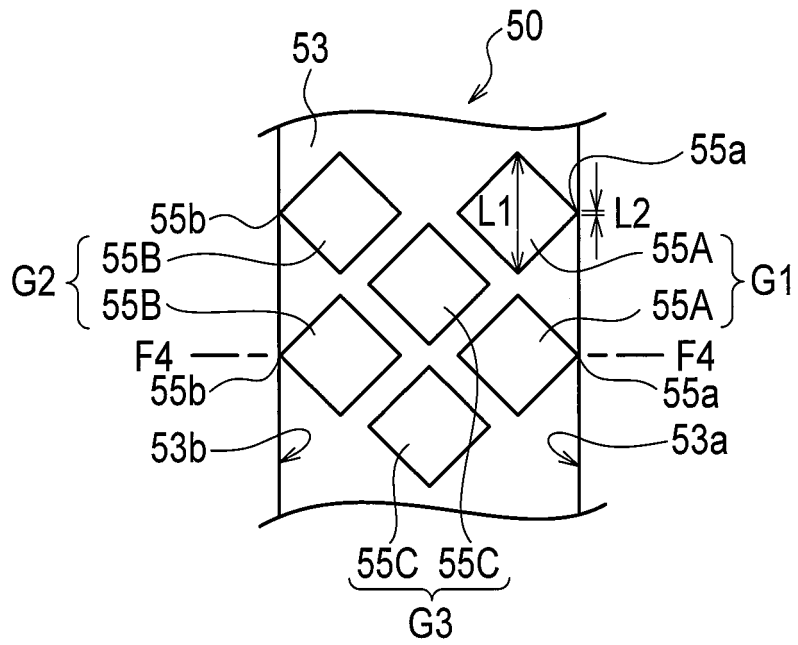


FIG. 4

(a)



(b)

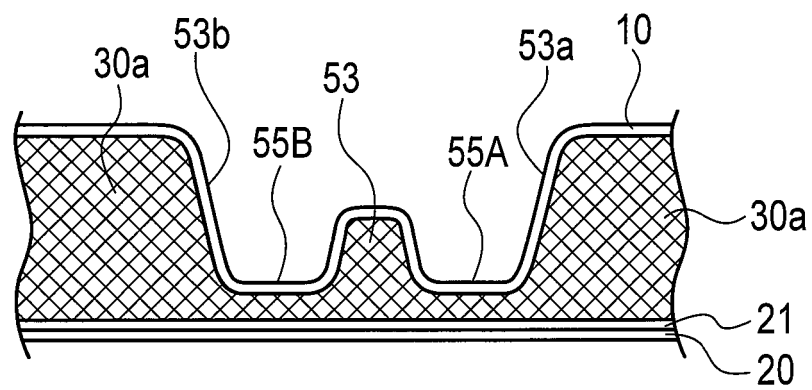


FIG. 5

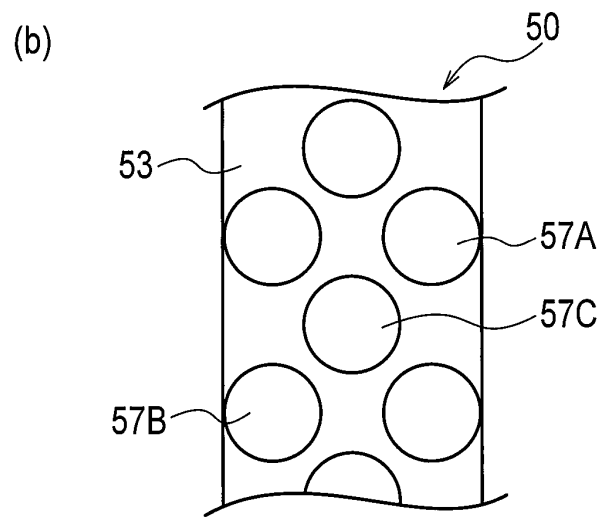
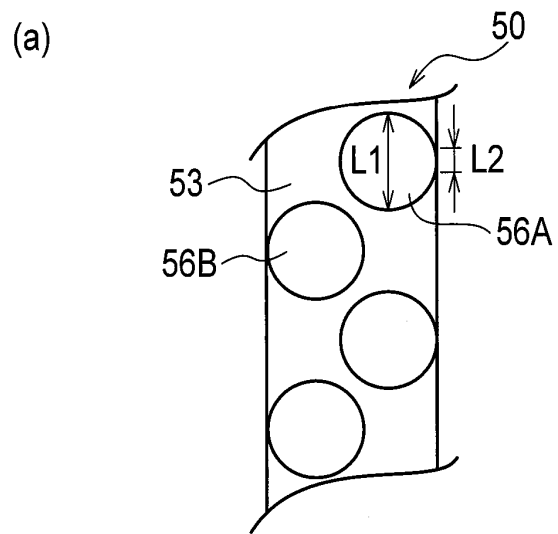


FIG. 6

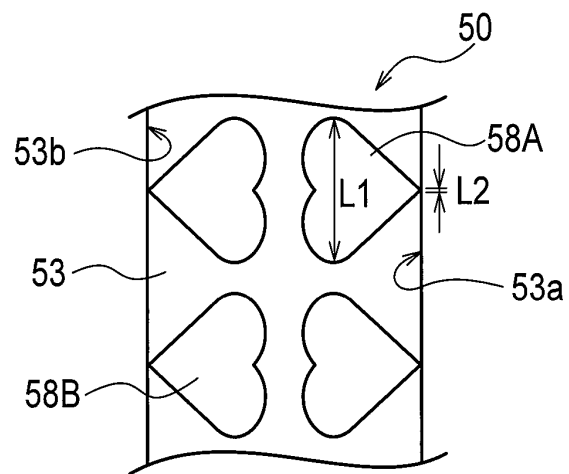


FIG. 7

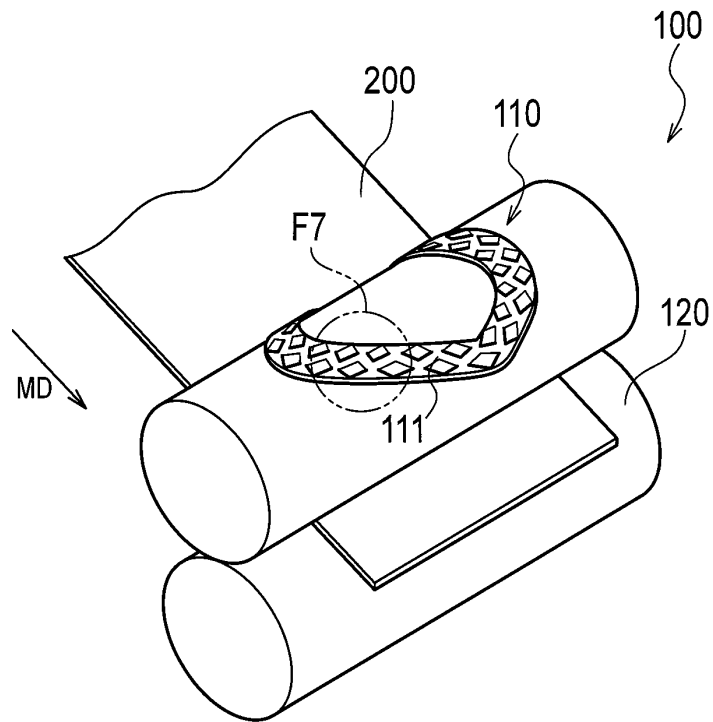
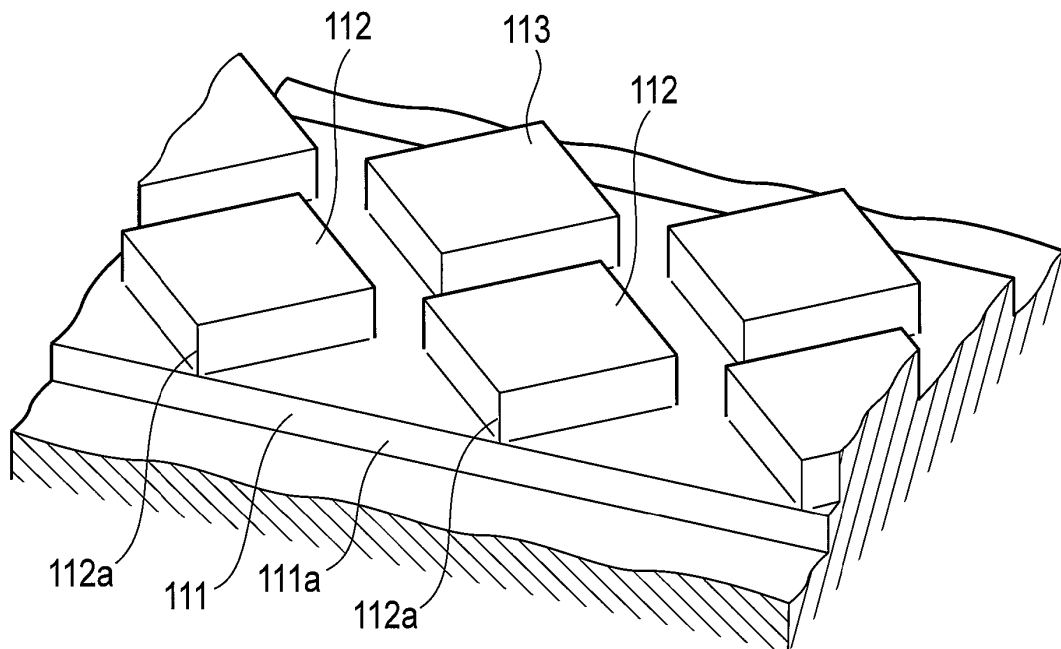


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/066229

A. CLASSIFICATION OF SUBJECT MATTER

A61F13/15(2006.01) i, A61F13/472(2006.01) i, A61F13/53(2006.01) i,
A61F13/539(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61F13/15, A61F13/472, A61F13/53, A61F13/539

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2010
Kokai Jitsuyo Shinan Koho	1971-2010	Toroku Jitsuyo Shinan Koho	1994-2010

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2006-326299 A (Yuhan-Kimberly Ltd.), 07 December 2006 (07.12.2006), entire text; all drawings & KR 10-2006-0119540 A & CN 1911198 A	1, 4 2-3, 5
X Y	JP 2002-531172 A (The Procter & Gamble Co.), 24 September 2002 (24.09.2002), paragraphs [0052] to [0054]; fig. 1, 14 to 15 & EP 1135089 A & WO 2000/032145 A1 & WO 2000/032146 A1 & WO 2000/032147 A1 & CN 1328439 A	1 2-5
Y	JP 2009-165862 A (Uni-Charm Corp.), 30 July 2009 (30.07.2009), paragraphs [0057] to [0058]; fig. 4 (Family: none)	2-4

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
24 November, 2010 (24.11.10)

Date of mailing of the international search report
07 December, 2010 (07.12.10)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/066229

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2001-178775 A (Kao Corp.), 03 July 2001 (03.07.2001), paragraph [0020]; fig. 4 (Family: none)	2-4
Y	JP 8-510150 A (Kimberly-Clark Corp.), 29 October 1996 (29.10.1996), fig. 2 & US 5454800 A & EP 774946 A & WO 1994/026221 A1 & CN 1124448 A	5

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/066229

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Since the inventions in claims 2 - 5 refer to claim 1, the technical feature common to the inventions in claim 1 - 5 is relevant to the matter set forth in claim 1.

However, the invention in claim 1 does not have novelty in the light of the invention described in the document 1 (JP 2006-326299 A) or the document 2 (JP 2002-531172 A) and does not have a special technical feature.

(continued to extra sheet)

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/066229

Continuation of Box No.III of continuation of first sheet (2)

Consequently, the inventions in claims 1 - 5 have no technical relationship involving one or more of the same or corresponding special technical features, and therefore cannot be considered to be so linked as to form a single general inventive concept.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2000014701 A [0007]
- JP 2009218184 A [0053]